

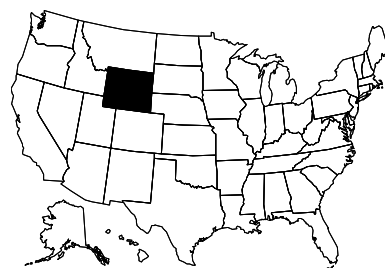
WYOMING

Contact Information

Jeremy ZumBerge, Monitoring Program Supervisor
Wyoming Department of Environmental Quality (WYDEQ)
1043 Coffeen Avenue, Suite D ■ Sheridan, WY 82801
Phone 307/672-6457 ■ Fax 307/674-6050

email: jzumbe@state.wy.us

WYDEQ Water Quality Division website: <http://deq.state.wy.us/wqd/index.asp?pageid=5>



Program Description

The primary objective of bioassessments conducted by the Wyoming Department of Environmental Quality (WYDEQ) is to assess the support of aquatic life for 303(d) listing and 305(b) reporting, using macroinvertebrates as the primary indicator. The program has been in existence since 1993, when it was initiated in the form of the Reference Stream Project (RSP). The primary goal of the RSP was to collect baseline biological data at least-impacted (reference) streams in each ecoregion of Wyoming as a benchmark for assessing biological and water quality conditions of other streams across the State. In 1998, the focus shifted from collecting reference stream data to using RSP data as a benchmark to assess biological conditions of other Wyoming streams as part of the Beneficial Use Reconnaissance Program (BURP). BURP uses a comprehensive approach (chemical, physical, and biological components) to assess water quality conditions of Wyoming streams. Today, the RSP is still ongoing, but at a much smaller scale.

Several other organizations have been or will be important sources of bioassessment data in Wyoming. The Wyoming Association of Conservation Districts (WACD) has been very involved in collecting biological data at streams across Wyoming. With proper guidance, local Conservation Districts (CDs) can elect to assume some of WYDEQ's bioassessment responsibilities, with the data being used for 303(d) and 305(b). Many CDs have welcomed the opportunity to collect bioassessment data.

The USGS also has been a very important source of biological data. Wyoming has contracted the USGS-Wyoming District to carry out the Environmental Monitoring and Assessment Program (EMAP) monitoring in Wyoming. Approximately 50 randomly selected sites will be assessed over the four year contract, with the end goal being an unbiased estimate of water quality conditions in the State. The USGS also conducted an assessment of the Yellowstone River Basin of Wyoming and Montana as part of the National Water-Quality Assessment Program (NAWQA). The considerable amount of biological data generated from these studies is being evaluated for comparability with WYDEQ data to explore the usefulness of these data for 305(b) purposes. In addition, joint-funding agreements are in place with the USGS that allow for enhanced biological monitoring of streams in areas affected by coal bed methane development.

The Wyoming Game and Fish Department (WGFD) is an important source of fish data. WYDEQ has chosen not to sample fish communities as part of bioassessments, but uses WGFD data for determining support of fisheries uses, as well as in classifying streams for assignment of uses and designating appropriate water quality standards associated with those uses.

Wyoming has made significant strides in recent years in the development of multimetric biocriteria. Work will continue toward refining the existing numeric criteria and narrative aquatic life standard, and toward the eventual implementation of numeric aquatic life standards. Implementation of numeric standards is sure to be a challenging effort. The physical heterogeneity of Wyoming (e.g., climate, landscape, land use, and geology) poses significant scientific challenges. Political considerations are also likely to pose challenges.

Currently, WY is exploring the use of predictive models for assessing biological conditions of streams, as well as the addition of periphyton as an additional biological indicator to supplement macroinvertebrate data and WGFD fish data used in bioassessments. Periphyton samples have been collected at a limited number of long-term reference stations in the past, and the use of periphyton data will expand in coming years.

Documentation and Further Information

Wyoming's 2000 305(b) State Water Quality Assessment Report and 2000 303(d) Report:
<http://deq.state.wy.us/wqd/watershed/01452-doc.pdf>

Wyoming Surface Water Quality Standards: <http://deq.state.wy.us/wqd/index.asp?pageid=52#Stand>

Manual of SOPs for Sample Collection and Analysis: <http://deq.state.wy.us/wqd/watershed/10574-doc.pdf>

WYDEQ Water Quality Division Five-Year Comprehensive Monitoring Plan, 2001 Update, October 2001:
<http://deq.state.wy.us/wqd/watershed/12806-doc.pdf>

Jessup, B.K. and J.B. Stribling. 2000. *Testing the Wyoming stream integrity index*. Prepared by Tetra Tech, Inc., Owings Mills, Maryland, for USEPA Region 8, Denver, CO.

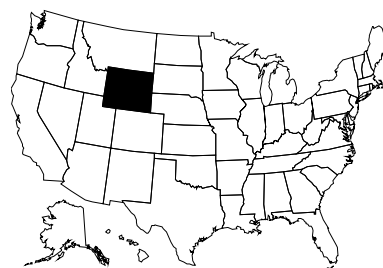
Gerritsen, J.; Jessup, B.K.; King, K.; Smith, J. and Stribling, J.B. 2000. *Development of Biological Criteria for Wyoming Streams and their Use in the TMDL Process*. Prepared by Tetra Tech, Inc., Owings Mills, Maryland, for USEPA Region 8, Denver, CO.

Data can be found online at <http://wy.water.usgs.gov/> and <http://www.wrds.uwyo.edu/>

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Programmatic Elements

Uses of bioassessment within overall water quality program	<input checked="" type="checkbox"/>	problem identification (screening)
	<input checked="" type="checkbox"/>	nonpoint source assessments
	<input checked="" type="checkbox"/>	monitoring the effectiveness of BMPs
	<input checked="" type="checkbox"/>	ALU determinations/ambient monitoring
	<input type="checkbox"/>	promulgated into state water quality standards as biocriteria
	<input checked="" type="checkbox"/>	support of antidegradation
	<input checked="" type="checkbox"/>	evaluation of discharge permit conditions
	<input checked="" type="checkbox"/>	TMDL assessment and monitoring
	<input checked="" type="checkbox"/>	other: UAAs and site-specific standards
Applicable monitoring designs	<input checked="" type="checkbox"/>	targeted (i.e., sites selected for specific purpose) (<i>specific river basins or watersheds</i>)
	<input checked="" type="checkbox"/>	fixed station (i.e., water quality monitoring stations) (<i>specific river basins or watersheds</i>)
	<input type="checkbox"/>	probabilistic by stream order/catchment area
	<input type="checkbox"/>	probabilistic by ecoregion, or statewide
	<input checked="" type="checkbox"/>	rotating basin (<i>specific river basins or watersheds</i>)
	<input type="checkbox"/>	other:

Stream Miles

Total miles **113,422**

(determined using RF3, 2000 and National Hydrography Database, 2001)

Total perennial miles 32,520

Total miles assessed for biology* **2,639**

fully supporting for 305(b) 2,124

partially/non-supporting for 305(b) 177

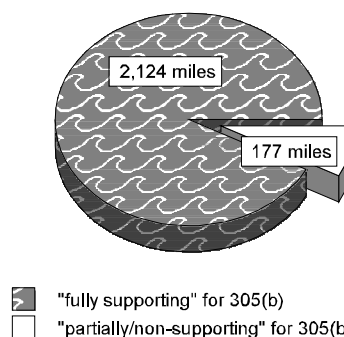
listed for 303(d) 177

extent fully supporting, but threatened 388

number of sites sampled 700+

number of miles assessed per site 3.25

2,639 Miles Assessed for Biology



*Since a Weight-of-Evidence approach is used in use support decisions, the numbers provided reflect waterbody reach extent where some type of biological data were used in the assessment.

Aquatic Life Use (ALU) Designations and Decision-Making

ALU designation basis	Class System (A,B,C), Fishery Based Uses and Warm Water vs. Cold Water	
ALU designations in state water quality standards	Game Fish (Warm Water and Cold Water Game Fish), Non-game Fish and Aquatic Life Other than Fish	
Narrative Biocriteria in WQS	Formal/informal numeric procedures exist to support ALU decisions.	
Numeric Biocriteria in WQS	under development (Numeric biocriteria are in use but are still being refined and are not yet incorporated in WY's water quality standards.)	
Uses of bioassessment data in integrated assessments with other environmental data (e.g., toxicity testing and chemical specific criteria)	<input checked="" type="checkbox"/>	assessment of aquatic resources
	<input checked="" type="checkbox"/>	cause and effect determinations
	<input type="checkbox"/>	permitted discharges
	<input checked="" type="checkbox"/>	monitoring (e.g., improvements after mitigation)
	<input checked="" type="checkbox"/>	watershed based management
Uses of bioassessment/biocriteria in making management decisions regarding restoration of aquatic resources to a designated ALU	Trend analysis in watershed improvement projects and following degradation resulting from construction projects and spills.	

Reference Site/Condition Development

Number of reference sites	140 based on field investigation checklist 90 based on quantitative physical and chemical filters	
Reference site determinations	<input type="checkbox"/>	site-specific
	<input type="checkbox"/>	paired watersheds
	<input checked="" type="checkbox"/>	regional (aggregate of sites)
	<input checked="" type="checkbox"/>	professional judgment (<i>Best Professional Judgment based on landscape and field investigation coupled with select water chemical and physical filters</i>)
	<input type="checkbox"/>	other:
Reference site criteria	Site is identified by the field investigation to be "reference quality" based on analysis of a 27 item checklist of reach and watershed characteristics plus select ecoregion specific quantitative physical and chemical filters.	
Characterization of reference sites within a regional context	<input type="checkbox"/>	historical conditions
	<input checked="" type="checkbox"/>	least disturbed sites
	<input type="checkbox"/>	gradient response
	<input checked="" type="checkbox"/>	professional judgment
	<input type="checkbox"/>	other:
Stream stratification within regional reference conditions	<input checked="" type="checkbox"/>	ecoregions (or some aggregate)
	<input type="checkbox"/>	elevation
	<input type="checkbox"/>	stream type
	<input type="checkbox"/>	multivariate grouping
	<input type="checkbox"/>	jurisdictional (i.e., statewide)
	<input type="checkbox"/>	other:
Additional information	<input type="checkbox"/>	reference sites linked to ALU
	<input type="checkbox"/>	reference sites/condition referenced in water quality standards
	<input checked="" type="checkbox"/>	some reference sites represent acceptable human-induced conditions

Revisions December 2002

Field and Lab Methods

Assemblages assessed	<input checked="" type="checkbox"/>	benthos (<i>100-500 samples/year; single season, multiple sites – not at watershed level</i>)
	<input type="checkbox"/>	fish
	UD	periphyton
	<input type="checkbox"/>	other:
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Benthos		
sampling gear		Surber, dipnet; 500-600 micron mesh
habitat selection		riffle/run (cobble)
subsample size		500 count
taxonomy		combination--genus, species
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Periphyton		
sampling gear		natural substrate: brushing/scraping device (razor, toothbrush, etc.)
habitat selection		riffle/run (cobble)
sample processing		WYDEQ's periphyton program is under development. Samples have been collected, but analysis protocols are yet to be developed.
taxonomy		under development
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Habitat assessments		visual based, quantitative measurements, hydrogeomorphology, pebble counts (Wolman), streambank stability (Bauer and Burton - EPA910/R-93-017), pool quality (Bauer and Burton); performed with bioassessments
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Quality assurance program elements		standard operating procedures, quality assurance plan, periodic meetings and training for biologists, taxonomic proficiency checks, specimen archival

Data Analysis and Interpretation

Data analysis tools and methods	<input checked="" type="checkbox"/>	summary tables, illustrative graphs
	<input type="checkbox"/>	parametric ANOVAs
	UD	multivariate analysis
	<input checked="" type="checkbox"/>	biological metrics (<i>aggregate metrics into an index</i>)
	<input type="checkbox"/>	disturbance gradients
	<input type="checkbox"/>	other:
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Multimetric thresholds		
transforming metrics into unitless scores		95 th percentile of reference population
defining impairment in a multimetric index		25 th percentile of reference population
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Evaluation of performance characteristics	<input checked="" type="checkbox"/>	repeat sampling (<i>select sites are sampled annually to document annual variability</i>)
	<input checked="" type="checkbox"/>	precision (<i>side-by-side sampling at 10% of stations; Data Quality Objectives for density and number of taxa</i>)
	<input type="checkbox"/>	sensitivity
	<input type="checkbox"/>	bias
	<input type="checkbox"/>	accuracy
	<input type="checkbox"/>	
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Biological data		
Storage		STORET, EDAS, and internal spreadsheets
Retrieval and analysis		EDAS

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